Utah Smoke Bulletin

March 2019 Part 2 of 2: Smoke Modeling

Hi folks, here is some guidance on smoke emission and dispersion models, and how they may be used to meet the requirements of Utah's Smoke Management Plan.

EMISSIONS: Needed at two points in the process– First, when registering your large prescribed fire (i.e. greater than 20 acres or 300 hand piles) on the pre-burn information form. Second, on the daily emission report (form 5). *The form 5 is set up to take numbers in one of the 13 fuel models, but if you have better information from other software, simply change the tons of fuel/acre so the end result reflects it*. We have been asking folks to report tons of PM10 and will continue to do so for now, to maintain consistency. A few great options to get PM10 numbers are:

- Pile calculator—Web based, hand or machine piles. You will estimate number and size of piles.

- BlueSky playground — Web based consume model plus dispersion, simple but lots of custom options. Version 2 (user login) and 3 alpha (no login needed) are currently available. To save your v3 results, since there are no user accounts, bookmark the URL after you get your emissions results. The advantage of v3 is you can then share that URL with coworkers (like the smoke coordinator :)

- Fuel and Fire Tools (FFT)— Desktop based version of consume model.

- First Order Fire Effects Model (FOFEM) — Desktop based, it is recommend you enable "options>>settings>>expanded emissions factors", available on recent versions.

For all of this software, the more details you input about your fuel loading, moisture, and expected weather, the more accurate your result will be. None of them take fire behavior fuel *model* as an input. The fact that we do that on form 5 now is a little outdated; as mentioned above, please work around it when you have better numbers. We're looking at updating that process.

DISPERSION (key difference from emissions is a TIME factor (rate of release) used to calculate the concentration of specific pollutants in the atmosphere, such as micrograms/cubic meter of PM2.5): Not ordinarily required from burners. If in nonattainment areas, you may be asked to help develop dispersion scenarios. If conducting any very large rx fire (say over 100 tons PM projected), I'd advise you to develop some to understand the possible downwind effects. A couple options are:
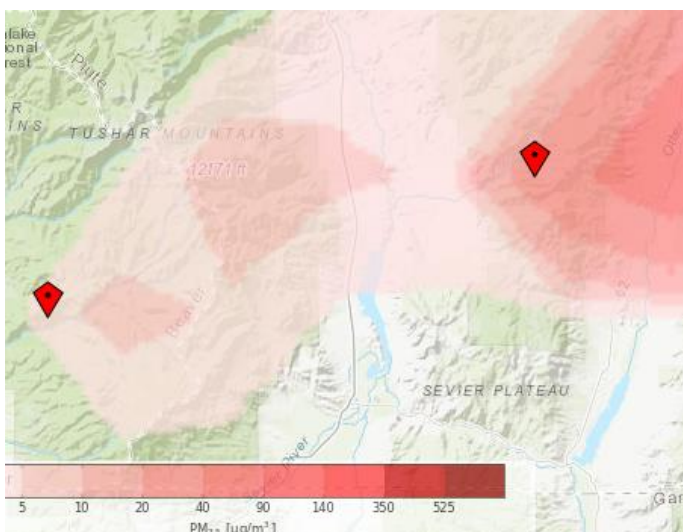
BlueSky playground — You can go beyond your emissions results in both bluesky versions to create a dispersion scenario. You will have to choose a date to get the meteorology. Up to two days in the future, and most dates in the recent past are available. When using the hysplit model, this is the current state of the art for modelling dispersion in complex terrain. It will take a few minutes. Will your actual results be just like the animation? No, but it will highlight potential impacts from your burn.

VSMOKE—Similar to the map you build on the smoke website, but with concentration lines (by Air Quality Index color category). VSMOKE is fast but does not account for complex terrain. Not recommended for multi-day events in the mountains, but could be useful for example on the shores of the Great Salt Lake.